Promising Potential of Electro-Coagulation Process for Effective Treatment of Biotreated Palm Oil Mill Effluents

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Abstract

The critical parameters namely initial pH, time and current density largely impact the process efficiency of electrocoagulation (EC). Few works have been done on observing the interaction of these critical parameters and the possible combined effect on the overall pollutant removal efficiency. Therefore, the knowledge of the combined effect of critical parameter interaction would enhance the optimization of EC parameters to attain maximum efficiency with limited resources. Using aluminium electrodes with interelectrode distance of 10 mm on synthetic wastewater, representing biotreated palm oil mill effluent (BPOME), with a set range of initial pH, current density, and time of 3-8, 40-160 mA/cm(2) and 15 to 60 minutes, respectively, the effect of the

three critical variables was investigated. The optimum Chemical Oxygen Demand (COD) removal of 71.5% was determined at pH 6, current density of 160 mA/cm(2) (with current 1.75 A) at EC time of 15 minutes. The experiment was validated with real BPOME, resulting in the removal efficiency of 60.7 % COD, 99.91 % turbidity, 100 % total suspended solids (TSS) and 95.7 % colour. Removal of a large quantity of pollutants in a time span of 15 minutes with optimized parameters in EC is notable for a wastewater treatment alternative that requires no extensive use of chemicals. The interaction of parameters observed in this study indicated a synergistic contribution of initial pH and current density in removing maximum wastewater COD in 15 minutes of EC.

Keywords

Author Keywords: Wastewater treatment; Industrial effluent; Optimization; Parameter interaction

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